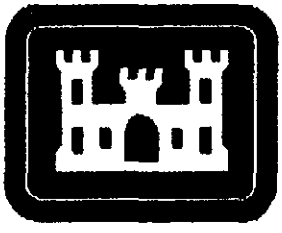
RECONNAISSANCE REPORT

RIVERDALE PUMPING STATION, WEST SPRINGFIELD, MASSACHUSETTS

CONNECTICUT RIVER

LOCAL FLOOD PROTECTION

SEPTEMBER 1985



US Army Corps
of Engineers
New England Division

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I. INTRODUCTION

A. AUTHORITY

This reconnaissance report was prepared under the authority contained in EC 11-2-147, which provides direction to review the adequacy of completed local protection projects that were specifically authorized by Congress.

B. LOCATION OF STUDY AREA

The town of West Springfield is situated in the central portion of Hampden County in southwestern Massachusetts about 90 miles west of Boston and 135 miles northwest of New York City (see Figure 1). West Springfield lies on the west bank of the Connecticut River and is bordered on the south by the Westfield River. The town has a land area of about 17.5 square miles and a 1980 population of 30,000 according to the State census. West Springfield is an attractive suburb with diversified manufacturing development that has shown considerable growth over the past several years.

As a result of earlier floods, particularly the record flood of 1936, the Corps of Engineers constructed two local protection projects in the town of West Springfield, referred to as the West Springfield and Riverdale Projects (see Figure 2). These projects were designed in conjunction with a system of upstream reservoirs to provide the town of West Springfield a high degree of flood protection.

Construction of the West Springfield Project was started in 1936 and the latest improvements were completed in 1953. The project consists of dikes and floodwalls which extend 8,500 feet along the west bank of the Connecticut River and 16,000 feet along the north bank of the Westfield River. Also included in the construction are three stop log structures and three pumping stations. Two other town built pumping stations were incorporated into the pumping system to remove interior storm drainage.

The Riverdale Local Protection Project was authorized by the Flood Control Act of 1941. Construction was started in 1949 and completed in 1950. The project consists of an earth dike which extends about 12,800 feet in an egg-shaped curve downstream along the south bank of Goldine Brook, downstream along the west bank of the Connecticut River, and upstream along the north bank of Bagg Brook to high ground near Morgan Road. Also included in the construction are three stop log structures and the Wayside and Riverdale Pumping Stations, which remove interior drainage from behind the project (see Figure 3).

The study area encompasses the Riverdale Project. However, at the request of the West Springfield Board of Selectmen, particular attention has been directed toward review of the Riverdale Pumping Station.

C. PURPOSE AND SCOPE

By letter dated 21 November 1983, the West Springfield Board of Selectmen requested the Corps of Engineers to determine if the Riverdale Pumping Station has sufficient capacity to handle stormwater runoff under future development conditions. Plans for the development of two large commercial centers within the drainage area of the Riverdale Pumping Station have been approved by the town of West Springfield and are now under construction. Over 100 acres of vacant land are planned to be developed as part of these projects, which are scheduled to be completed over the next 5 years. West Springfield officials realize that this construction will increase interior runoff and are concerned for the adequacy of the Riverdale Station.

When the Riverdale Pumping Station was constructed, space was provided for the addition of a 24-inch pump to handle runoff under future development conditions. However, development in this area has been so intense concerns have been raised by the town of West Springfield that even this additional pumping capacity has or will be exceeded in the near future.

The purpose of this investigation is to determine the adequacy of the Riverdale Pumping Station under future development conditions, the economic feasibility of providing additional pumping capacity at this station if necessary and the extent of Federal assistance.

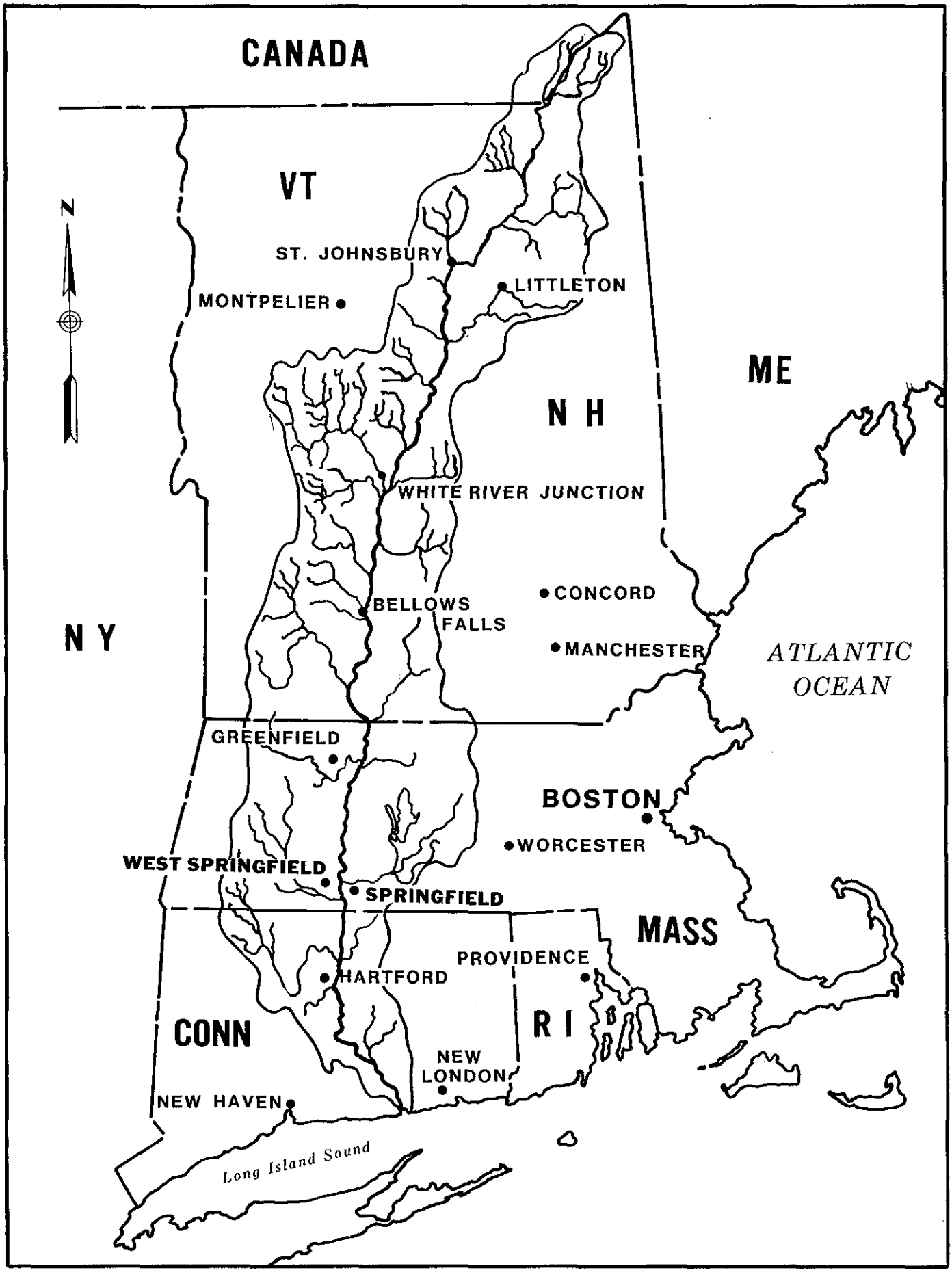
The scope of this investigation is reconnaissance level.

D. PUBLIC COORDINATION

The town of West Springfield requested the Corps to investigate the adequacy of the Riverdale Pumping Station, by letter dated 21 November 1983. A copy of this letter is contained in Section VIII of this report.

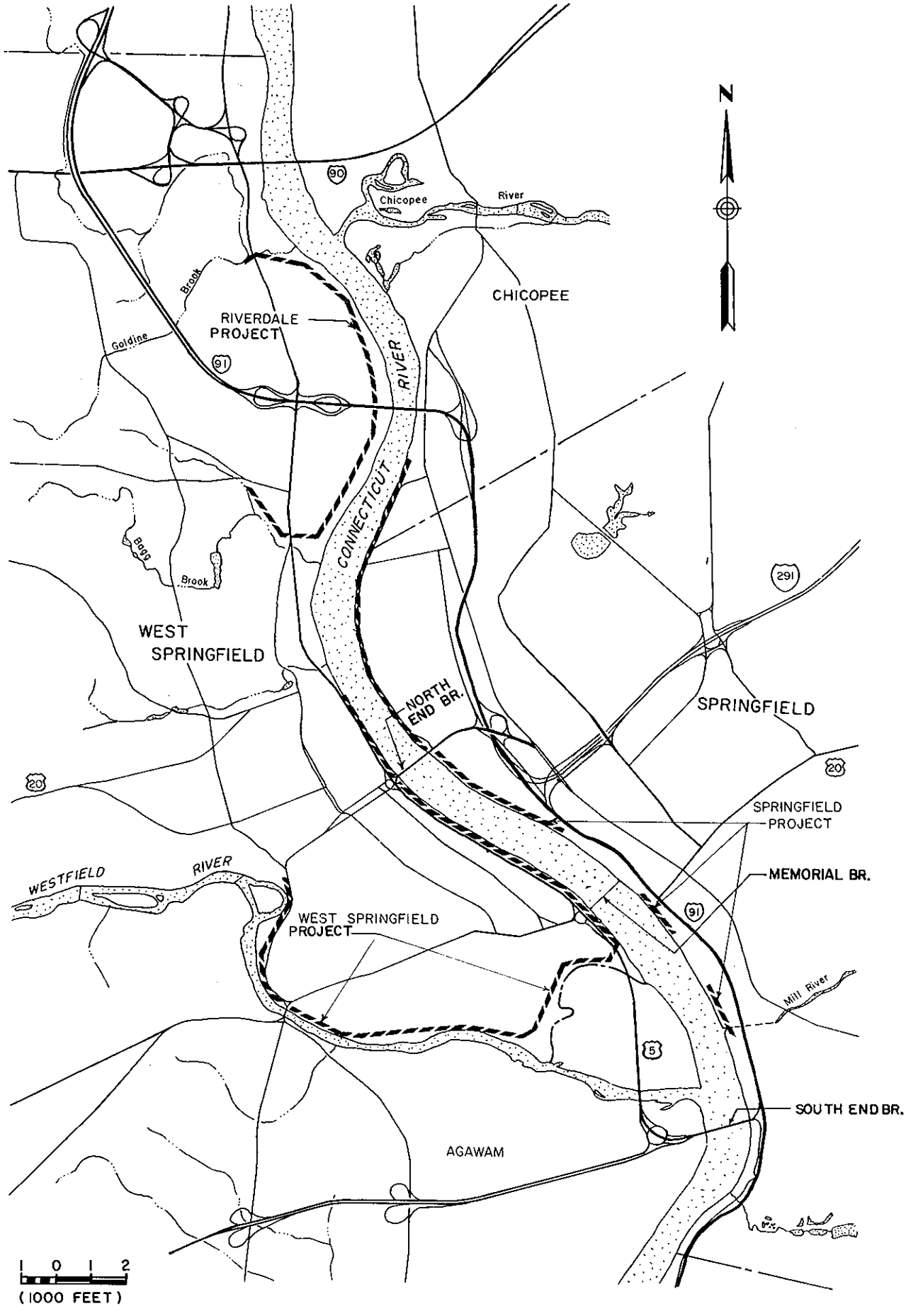
On 25 January 1984, Corps personnel met with Mr. Bob Spaulding, Director of the West Springfield Planning Department, and Mr. Wallace Wyman, Town Engineer, to discuss this investigation and gather information on development conditions behind the Riverdale Project. Mr. Spaulding provided land use maps showing development conditions at the time the Riverdale Project was constructed and under existing and future development conditions. Mr. Wyman provided plans showing existing and proposed drainage systems in the Riverdale area.

On 3 April 1985, Corps personnel met with Mr. Wyman to discuss the operation of the Riverdale Pumping Station. Mr. Wyman indicated that the town had begun a program to replace existing pumps because of the difficulty in finding replacement parts. An inspection of the Riverdale Station was made after the meeting.



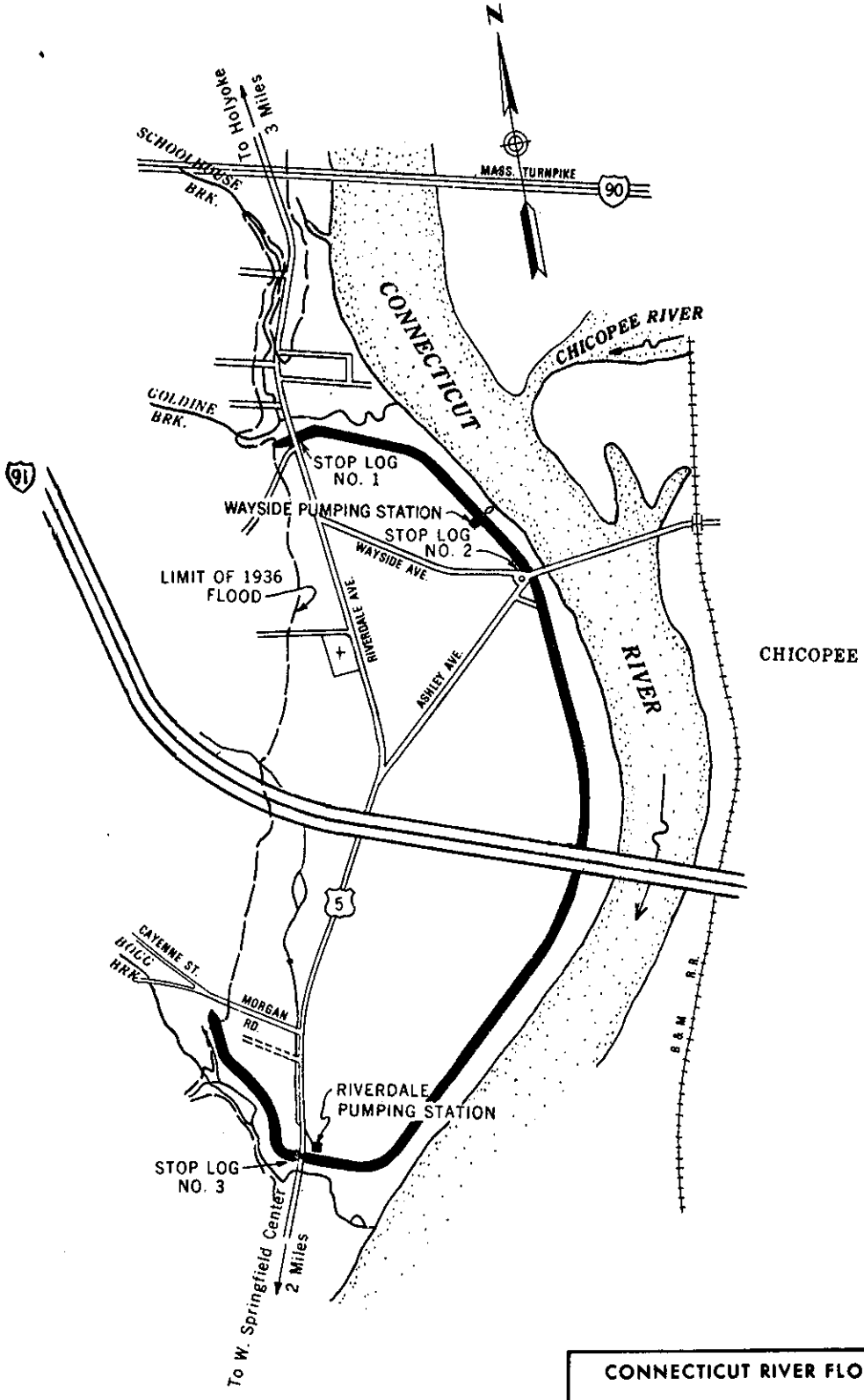
Connecticut River Basin

FIGURE 1



Existing Projects

FIGURE 2



CONNECTICUT RIVER FLOOD CONTROL

WEST SPRINGFIELD, MASS.

(RIVERDALE DIKE)

LOCAL PROTECTION PROJECT

CONNECTICUT & WESTFIELD RIVERS MASS.

30 JUNE 1963

NOT TO SCALE

NEW ENGLAND DIVISION WALTHAM, MASS.

FIGURE 3

E. OTHER STUDIES

The Corps of Engineers were contracted by the Federal Insurance Administration to perform a Flood Insurance Study for the town of West Springfield, Massachusetts. This study was completed in 1976. West Springfield joined the regular phase of the flood insurance program on 30 September 1977.

The New England River Basins Commission developed a unified program for flood plain management within the Connecticut River Basin. The resulting report entitled "The Rivers Reach" dated December 1976, included a recommendation to investigate the feasibility of raising the height of the Riverdale Local Protection Project.

At the request of the West Springfield Board of Selectmen, the Corps of Engineers conducted a study under Section 216 Authority, Review of a Completed Project, to determine the feasibility of increasing the height of the Riverdale and West Springfield Projects to provide SPF [1] protection. This study was completed in November 1980 and determined that raising these projects approximately 5 feet to provide SPF protection was not economically justified. In an effort to reduce the risk of catastrophic flood losses in West Springfield, further studies were performed by the Corps of Engineers which investigated lower degrees of protection. These studies were conducted under the special continuing authority contained in Section 205 of the 1948 Flood Control Act, as amended. These studies resulted in a report which was forwarded to the Office of the Chief of Engineers in May 1982 recommending that the floodwall portions of the West Springfield Project be raised 1 foot and that a flood forecasting and warning system be installed. Floodwall modifications were completed in September 1984 and the flood forecasting and warning system is scheduled to be installed in the fall of 1985. No modifications were recommended to the Riverdale Project.

II. EXISTING CONDITIONS

A. PROJECT HISTORY

1. Construction

Construction of the Riverdale Project was started in 1949 and completed in 1950. The project includes 12,800 feet of earth dike, two pumping stations and three stop log structures. The project was constructed at a total first cost of $1,163,000. This includes items of

[1] SPF (Standard Project Flood) is a hypothetical flood that might be expected to occur from the most severe combination of rainfall and runoff conditions that are considered reasonably characteristic of the region.

local cooperation such as lands, easements, rights-of-way, and utility relocations which amounted to $25,000. By comparison, construction of the Riverdale Project in today's dollars would cost nearly $10 million.

2. Modifications

There have been no major modifications to the Riverdale Project since its construction.

3. Damages Prevented

The Riverdale and West Springfield Projects have prevented over $192 million in flood losses. Nearly 66 percent of these losses were prevented during the flood of June 1984.

4. Inspection

The most recent semi-annual inspection of the Riverdale Project was conducted on 4 June 1985. The project was found to be in satisfactory condition and capable of performing its intended function. Some minor deficiencies were noted which include:

(a) The roof of the Wayside Avenue Pumping Station leaks. Repair work is scheduled for July 1985.

(b) The open drainage ditch that runs along the toe of the dike shows signs of erosion and portions have filled in. Current plans are to enlarge and deepen the ditch to pick-up drainage from the two new shopping complexes that are being constructed behind the Riverdale Project.

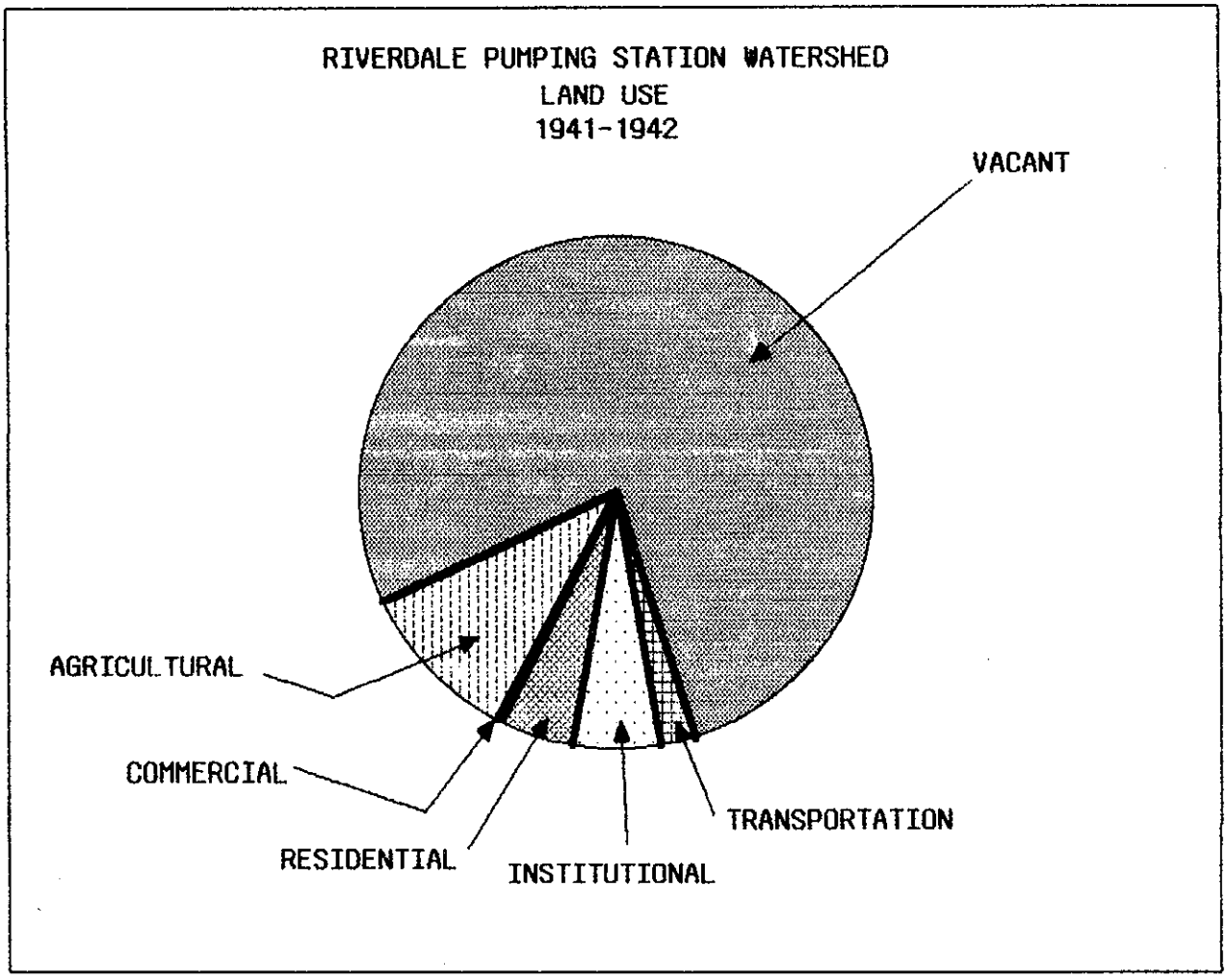
B. RIVERDALE PUMPING STATION

1. Interior Watershed

a. Size - The Riverdale Project has a total interior watershed of 670 acres, of which 548 acres are served by the Riverdale Pumping Station (see Plate 1).

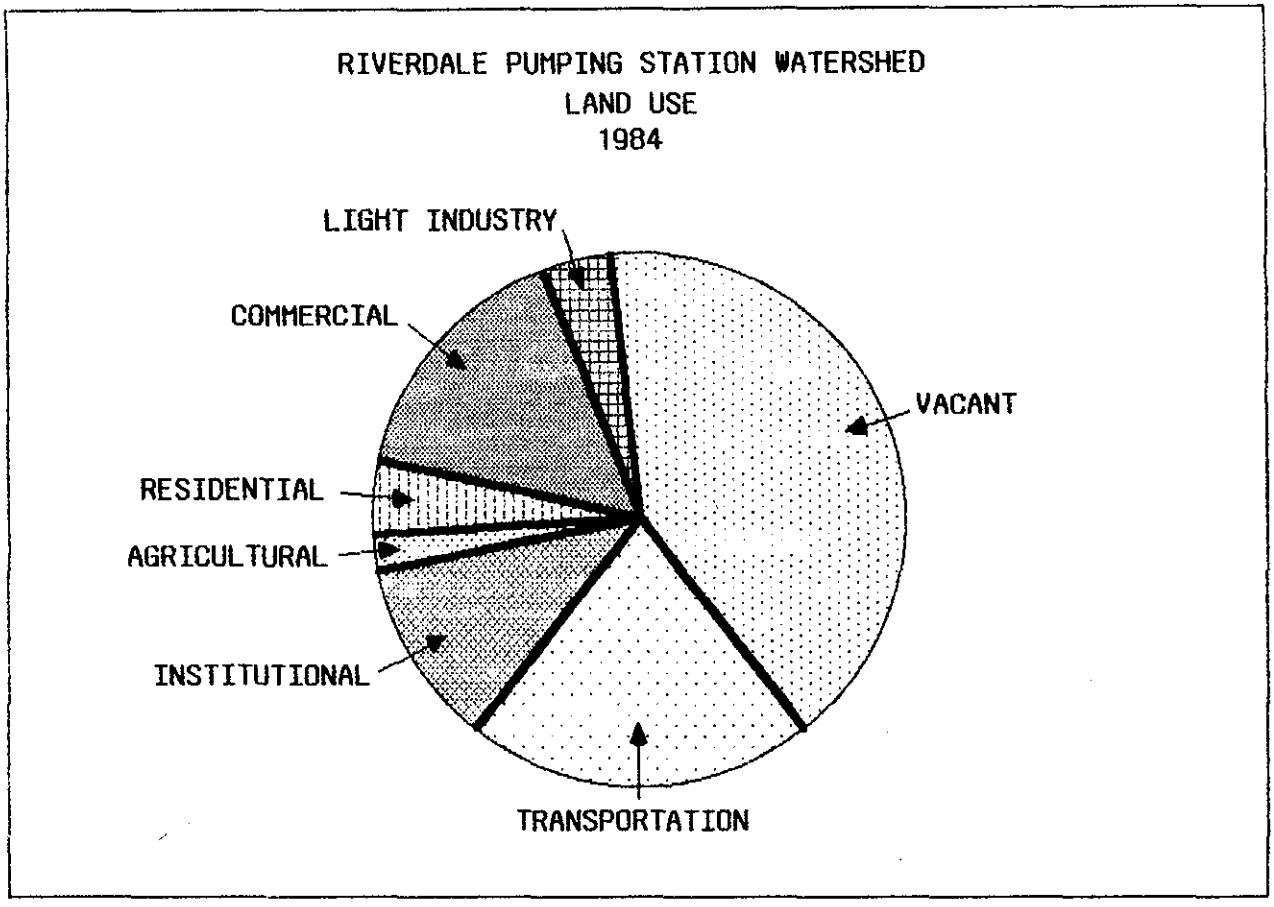
b. Topography - The interior watershed of the Riverdale Pumping Station is very flat, with the exception of about 150 acres along the western side.

c. Land Use - When the project was built in 1950, the interior watershed of the Riverdale Station was sparsely developed, consisting of vacant and agricultural land (see Figure 4). Over the past 35 years vacant and agricultural land has been replaced by highways, shopping malls, industry and associated support businesses (see Figure 5).



LAND USE	PERCENTAGE
INSTITUTIONAL	5.2 %
RESIDENTIAL	4.8 %
COMMERCIAL	0.2 %
AGRICULTURAL	10.6 %
TRANSPORTATION	2.3 %
VACANT	76.9 %
	100.0 %

FIGURE 4



LAND USE	PERCENTAGE
INSTITUTIONAL	11.6 %
RESIDENTIAL	4.8 %
COMMERCIAL	15.6 %
AGRICULTURE	2.0 %
LIGHT INDUSTRY	4.2 %
TRANSPORTATION	20.6 %
VACANT	41.2 %
	100.0 %

FIGURE 5

2. Interior Storm Drainage

Storm drains discharging to the Riverdale Station consist of a single 42-inch diameter drain which serves the area west of Riverdale Street. The 42-inch drain has a maximum capacity of 55 cubic feet per second (cfs). The remaining drainage to the station travels overland or in the open drainage ditch that was constructed along the toe of the dike. The open ditch has a maximum capacity of between 50-80 cfs.

3. Pumping Capacity

The Riverdale Pumping Station contains two pumps (14 and 24 inch) which have a total pumping capacity of 60 cubic feet per second at Connecticut River stage 63 feet NGVD[1]. The station was constructed with provisions for another 24-inch pump for a total capacity of 110 cfs. The original 1949 design was based on what was then estimated to be a 10-year frequency 8-hour rainfall of 2.6 inches with estimated infiltration losses of 0.4 and 0.34 inches per hour for existing and projected future development conditions, respectively. The resulting 2-hour design rainfall excess for present and future conditions was 0.9 and 1.0 inches. The resulting inflow hydrographs had peaks of 126 and 248 cfs, respectively, and outflow peaks of 60 and 110 cfs after adjustment for pondage.

4. Gravity Outlet

Gravity outlets allow for the passage of interior runoff that might otherwise be impounded by the line of protection. The 3 by 4.5 foot gravity outlet at the Riverdale Station was designed in 1949 for a peak outflow of 110 cfs with ponding to elevation 52.5 feet NGVD. This flow was based on a 10-year frequency event under what was then projected development conditions. General plans and profiles of the existing station are shown on Plates 2 and 3.

5. Ponding Area

The ponding area at the Riverdale Station has a design capacity of 12 acre-feet of storage. Twelve acre-feet of storage represents only 0.26 inches of runoff from the contributing 548 acres of interior drainage area.

C. EXISTING FLOOD LOSS POTENTIAL

Since the completion of the Riverdale Project in 1950, no serious flooding has been experienced within its interior watershed. However, extensive development of this area has increased interior runoff and has begun to tax the present capacity of the Riverdale Station. During late

[1]NGVD (National Geodetic Vertical Datum) is defined as the mean sea level of 1929.

May and early June of 1984, the coincidence of high stages on the Connecticut River and heavy rainfall caused minor flooding along Riverdale Street and required nearly two and one-half days of continuous pumping at the Riverdale Station. The existing pumps have been in service more than 30 years. Break-downs are inevitable and spare parts are difficult to obtain. The proposed construction of two large commercial centers and the resulting increase of runoff has raised concern for the adequacy of the Riverdale Station.

III. FUTURE CONDITIONS

A. RIVERDALE PUMPING STATION INTERIOR WATERSHED

1. Future Land Use

Two large commercial centers are under construction on what was the largest tract of vacant land within the interior watershed of the Riverdale Station. This and other development in the Riverdale area is changing the character of the watershed from a once sparsely developed residential and agricultural area to a fairly developed light industrial and commercial zone. Figure 6 shows what is likely to be the land use characteristics of the watershed within the next 5 years.

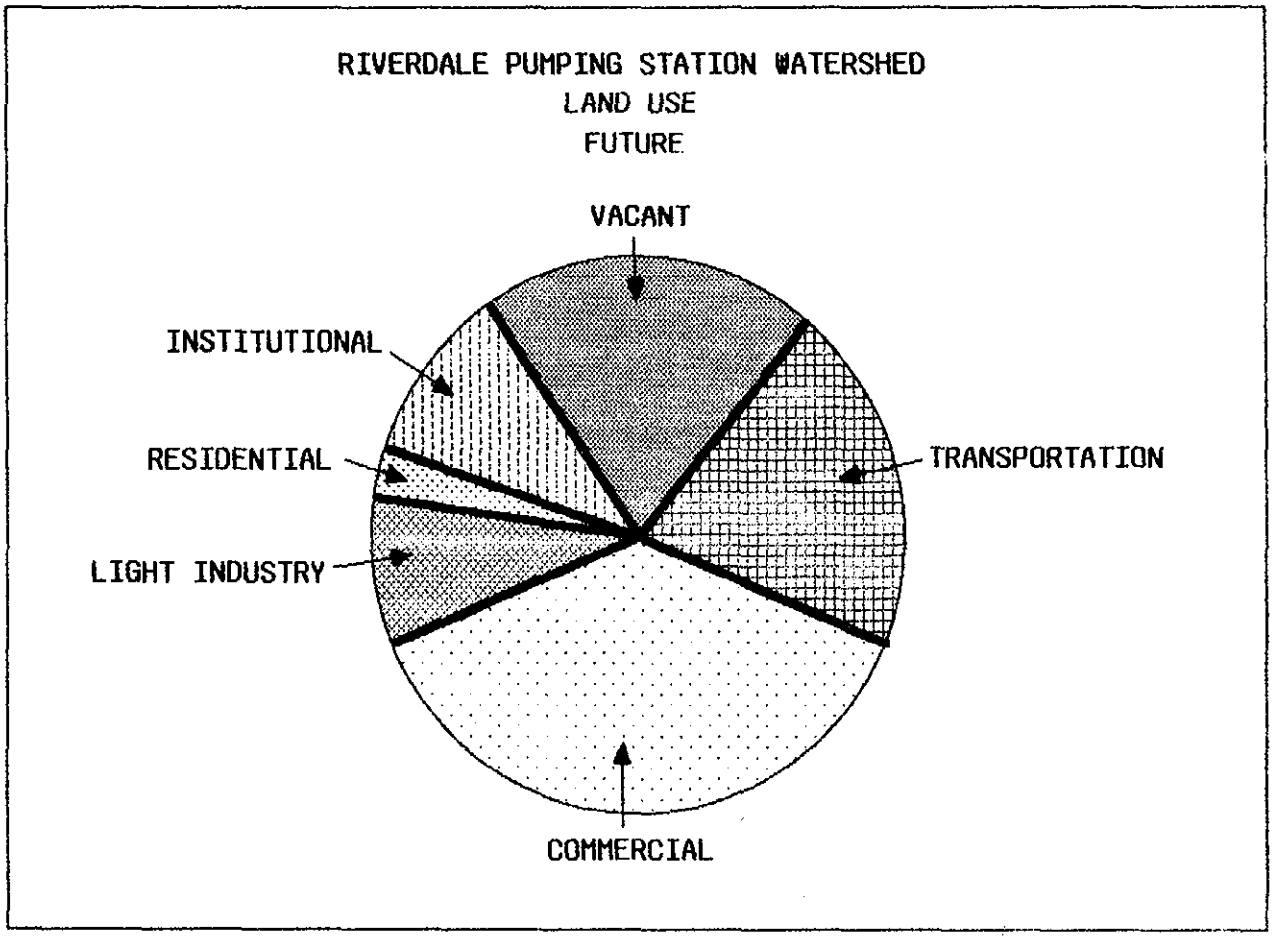
2. Future Interior Storm Drain Capacity

The existing 42-inch drainage system is being upgraded to a 6 by 6 foot trunk line drain with a design capacity of 220 cfs. The open drainage ditch that runs along the toe of the dike is being enlarged and deepened to pick-up drainage from the two large shopping centers being constructed. The enlarged ditch is being designed for a capacity of 200 cfs. The combined capacities of these two systems will be 420 cfs (see Table 1).

TABLE 1

INTERIOR STORM DRAINAGE CAPACITY

	Original Conditions 1949 (cfs)	Existing Conditions 1984 (cfs)	Proposed Future Design (cfs)
Storm Drains	55	55	220
Open Channel	50-80	50-80	200
TOTAL	105-135	105-135	420



LAND USE	PERCENTAGE
COMMERCIAL	37.3 %
RESIDENTIAL	3.0 %
INSTITUTIONAL	10.2 %
LIGHT INDUSTRY	8.6 %
TRANSPORTATION	20.6 %
VACANT	20.3 %
	100.0 %

FIGURE 6

3. Future Runoff Potential

As development occurs and storm drainage systems are improved within the interior watershed of the Riverdale Station, the volume of runoff handled by this station will increase. Table 2 compares the original 1949 estimates of peak runoff and excess rainfall with current estimates.

TABLE 2
RIVERDALE PUMPING STATION WATERSHED
PEAK RUNOFF

Storm	Rainfall		Projected Development Conditions	
	24 hour (inches)	1 hour (inches)	Peak Runoff (cfs)	Excess Rainfall (inches)
2-year	3.0	1.2	105	0.96
10-year (Original Design)	5.0	1.8	270 (248)	2.45 (1.00)
100-year	7.0	2.6	440	4.15

Note that the 1949 original design estimate of peak runoff under what was then projected development conditions is not much less than the current estimate. However, the current estimates of excess rainfall is more than double the original estimate. This shows a significant increase in the volume of runoff being handled by the Riverdale Station.

B. FUTURE FLOOD LOSS POTENTIAL

Plans are underway to expand an existing mall and construct a new commercial complex within the Riverdale Station watershed. Although the proposed first floor elevations of these new complexes are above the estimated 100-year flood level, this and other construction in the area will continue to increase interior runoff and the potential for future flood losses.

During November 1984, a flood damage evaluator from the New England Division of the Corps of Engineers conducted a survey of properties within the Riverdale Station watershed that would be subject to interior flooding under future development conditions. Most of these properties are located south of Route 91 along Riverdale Street. Physical damages to utilities, structures, and contents were estimated for various flood levels. In addition, estimates were made for lost income such as wages, fixed costs, and profits due to suspension of normal business because of flooding. Damage survey information was combined with hydrologic stage-frequency data to estimate recurring flood losses, which are shown in Table 3. It is estimated that the interior runoff for the 100-year event would cause first floor flooding to some 20 properties and result in approximately $2.7 million in damages.

TABLE 3
RIVERDALE STATION WATERSHED, WEST SPRINGFIELD, MA
ESTIMATED RECURRING FLOOD LOSSES
FUTURE DEVELOPMENT CONDITIONS

Frequency of Interior Flooding (Years)	Estimated Flood Losses
200	$4,686,000
100	2,678,000
50	2,063,000
25	1,650,000
10	609,000

It is estimated that under future development conditions average annual flood losses will equal approximately $175,000.

IV. CURRENT PLANNING AND DESIGN CRITERIA

A. RIVERDALE PUMPING STATION

1. Pumping Capacity

The pumping capacity of the Riverdale Station was originally designed to handle interior runoff from a 10-year storm. This design flood seems reasonable considering the following hydrologic factors:

(a) Frequency and duration of high river stages requiring pumping.

(b) Likely coincidence of interior rainfall-runoff and high river stage.

(c) Interior watershed size and runoff potential.

(d) The interior flood damage potential.

More detailed discussion of the adequacy of the Riverdale Pumping Station is contained in the supplemental report entitled "Hydrologic Review of Riverdale Area Interior Drainage Facilities," which was prepared by the Water Control Branch of the New England Division in December 1984.

Under future development conditions the 10-year storm is estimated to have 2.45 inches of excess rainfall with a resulting peak runoff of 270 cfs. Analysis of this flood runoff reveals that a minimum pumping capacity of 180 cfs would be required to prevent interior ponding from exceeding the existing 12 acre-feet of storage available at the Riverdale Station. Table 4 compares the original 1949 design of the required pumping capacity of the Riverdale Station with current estimates.

TABLE 4
RIVERDALE PUMPING STATION
PUMPING CAPACITY DESIGN
(Connecticut River Stage 63 feet NGVD)

	Design Storm	Development Conditions	Peak Runoff (cfs)	Excess Rainfall (inches)	Required Pumping Capacity (cfs)
Original Design (1949)	10-year	1949	126	0.90	60
Original Design (1949)	10-year	Projected Future	248	1.00	110
Current Design (1985)	10-year	Projected Future	270	2.45	180

2. Gravity Outlet

Gravity outlets through floodwalls and dikes are necessary for the passage of interior runoff, river stages permitting, that might otherwise be impounded by the line of protective works. An inadequately sized gravity outlet can back-up interior drainage causing worse flooding than without protective works. For this reason, gravity outlets are an integral part of the protective system and in more recent designs have been sized for high interior runoff rates, namely the 1 percent (100-year) event.

The gravity outlet at the Riverdale Station was designed in 1949 to handle runoff from a 10-year storm under what was then projected development conditions. As a result, the existing outlet has significantly less capacity than what would be provided under current design criteria. In addition, growth within the watershed of the Riverdale Station has exceeded the development projections of 1949. Under what is now projected development conditions, the 100-year year storm would have 4.1 inches of rainfall excess and a resulting peak runoff of 440 cfs. Analysis of this flood indicates that the required discharge capacity of the gravity outlet would be 290 cfs. This updated design gravity discharge is 2.6 times greater than the original 110 cfs capacity as shown in the following table.

TABLE 5
RIVERDALE PUMPING STATION
GRAVITY OUTLET DESIGN

	Design Storm	Development Conditions	Peak Runoff (cfs)	Excess Runoff (Inches)	Required Outlet Capacity (cfs)	Ponding Area Acre-Feet
Original Design (1949)	10-year Future	Projected	248	1.00	110	12
	100-year	1949	195	2.6	110	25
Present Design (1985)	100-year Future	Projected	440	4.1	290	25

It should be noted that with the proposed gravity outlet capacity, ponding will exceed the 12 arce-feet of storage available at the Riverdale Station and that some minor flooding will occur. This was considered acceptable since it would only occur during rare events.

It should also be noted that the existing gravity outlet does not have the full 110 cfs capacity due to a sanitary sewer line which passes through the outlet structure. This sewer line is no longer used and should be removed by the town of West Springfield.

A supplemental 4 by 5 foot gravity conduit, in addition to the existing 3 by 4.5 foot conduit, would be required to meet current design criteria. With the supplemental conduit, the Riverdale Station would have a gravity discharge capacity of 290 cfs and would be capable of handling interior runoff from the 100-year local storm under what is now projected development conditions. This additional outlet capacity would allow for the free outflow of interior drainage through the line of protective works. Because gravity outlets are designed to restore normal drainage paths and prevent interior flood losses that might be caused by the construction of local protection projects, the supplemental gravity conduit should be added to the Riverdale Station regardless of economic justification.

3. Ponding Area

Adjacent development excludes the possibility of increasing the ponding area at the Riverdale Station.

V. MODIFICATION OPPORTUNITIES

A. WITHOUT PROJECT CONDITIONS

In the absence of any flood control improvements at the Riverdale Pumping Station, new development within the interior watershed will continue to increase runoff and future flood losses. Average annual flood losses are estimated to equal $175,000 under future development conditions.

The town of West Springfield is in the process of replacing the two existing pumps at the Riverdale Station. It is assumed that the town will make these improvements regardless of any other flood control improvements at the Riverdale Station.

B. ALTERNATIVE FLOOD DAMAGE REDUCTION MEASURES

Hydrologic analysis of the Riverdale Station has revealed that additional pumping capacity alone would due little to reduce annual flood losses. This is because of the very restrictive gravity outflow capacity of the Riverdale Station. For this reason, both of the plans developed during this investigation involve the addition of a 4-foot by 5-foot gravity conduit to the Riverdale Station. This additional gravity outflow capacity is needed to meet current design criteria and handle interior runoff from a 100-year local storm. Lesser size gravity conduits were not examined because of the relatively small cost savings.

Both plans also include the removal of the sewer line which passes through the existing gravity outlet. This sewer line is no longer used and should be removed by the town of West Springfield.

The two plans developed during this investigation are discussed in the following paragraphs.

1. PLAN I

Provisions were made at the time the Riverdale Station was constructed for the addition of a 24-inch pump. Plan I involves adding a 4-foot by 5-foot gravity conduit and the additional 24-inch pump to the Riverdale Station. These measures would increase the station's gravity outflow capacity from 110 to 290 cfs, and its pumping capacity from 60 to 110 cfs at Connecticut River stage of 63 feet NGVD. The estimated first cost of this plan is $370,000. Amortizing this cost over a 50-year economic life at the current Federal interest rate of 8-3/8 percent, yields an annual cost of $32,700. This includes interest during consruction and the cost of replacing the new engine every 25 years.

Under projected development conditions, the addition of a 4-foot by 5-foot gravity conduit and a new 24-inch pump to the Riverdale Station is estimated to reduce average annual flood losses in this area by

$51,000. Comparing this reduction in annual flood losses to the annual cost of Plan I results in a benefit-to-cost ratio of 1.56 to 1. A benefit to cost ratio greater than one indicates that Plan I is economically justified.

2. PLAN II

Plan II involves adding the 24-inch pump to the Riverdale Station and the construction of a new pumping station. The new station would be located adjacent to the Riverdale Station and would have a pumping capacity of 70 cfs, for a combined capacity of 180 cfs at the two stations. The new station would have a 4-foot by 5-foot gravity outlet structure. The two stations would share the existing ponding area. This plan has an estimated first cost of $1,160,000. The annual cost of the initial investment, interest during construction, and engine replacement equals $103,700.

It is estimated that under projected development conditions, Plan II would reduce average annual flood losses by $107,000. Comparing this reduction in annual flood losses to the cost of Plan II results in a benefit to cost ratio of 1.03 to 1. Plan II is also economically justified.

C. SUMMARY OF ALTERNATIVE PLANS

As shown in Table 6, both plans are economically feasible. However, Plan I maximimizes net benefits and is, therefore, the most economical plan.

TABLE 6
SUMMARY OF ALTERNATIVES
(June 1985 Price Level)

Plan	First Cost	Annual Cost	Annual Benefits	Net Benefits	B/C Ratio
I	$ 370,000	$ 32,700	$ 51,000	$18,300	1.56 to 1
II	$1,160,000	$103,700	$107,000	$ 3,300	1.03 to 1

VI. CONCLUSIONS

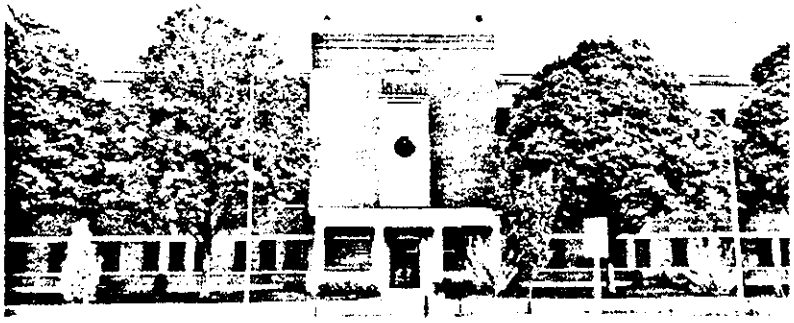
This investigation has determined that the pumping and gravity outflow capacities of the Riverdale Station are inadequate to handle interior runoff under projected development conditions. These inadequacies have resulted from changes in the design criteria of gravity outlets and more intense development within the drainage area of the Riverdale Station than could have reasonably been expected to occur when the station was originally designed in 1949.

A preliminary appraisal of costs and benefits has established the economic feasibility of increasing both the gravity outflow and pumping capacity of the Riverdale Station. Of the two alternatives examined during this investigation, Plan I was found to be the most economical method of providing additional gravity outflow and pumping capacity. It is estimated that under projected development conditions, this work would reduce average annual flood losses within the interior drainage area of the Riverdale Station by 29 percent. Additional protection can be achieved by the adoption of minimum first floor elevations for all new construction within the Riverdale area, and the provision of on-site storage at new development sites.

This investigation has also established a Federal interest in the construction of additional gravity outflow and pumping facilities at the Riverdale Station. This work can be accomplished under Section 205 of the Continuing Authorities Program.

6 Sept 1985
Date

Joseph L. Ignazio
Chief, Planning Division



Town of
WEST SPRINGFIELD
MASSACHUSETTS
OFFICE OF
BOARD OF SELECTMEN

November 21, 1983

Commanding Officer
New England Division
U. S. Army, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254

Re: Drainage Study, Riverdale Dike Empoundment Area

Dear Sir:

On behalf of the Town of West Springfield, we are requesting your opinion as to whether or not it will be possible for the Corps of Engineers to undertake a study, within the next year or two, to determine what additional facilities, if any, will be required to accommodate the increased stormwater runoff now generated by the businesses and dwellings within the drainage area as well as new construction that may reasonably take place there because of new zoning recently approved by the Town.

Two tracts of land on the easterly side of Riverdale Street, totaling about 130 acres, are now processing development plans with the first portion, about 40 acres, ready to break ground next spring. The larger development is somewhat behind such a schedule. Since the land on which these developments is planned is now mostly unsurfaced and will become paved parking areas or buildings, we can forsee that the runoff will greatly increase over present flows and we are concerned that our present pumping station equipment at the Riverdale Street Dike Station may not be equal to the task without additional pumping equipment and/or additional gravity conduit capacity through the dike to allow runoff without pumping.

Your representative, Mr. Michael Minior, who met with us on October 31st regarding part of development easterly of Riverdale Street and its runoff problems, expressed the possibility of some assistance from the Corps on this problem. We discussed the many changes which have taken place since the end of World War II when the present dikes and pumping stations were designed for this area. It was brought out that a foundation and sleeves were placed in the present station to provide for an additional pump at some future time, perhaps now, to add more pumping capacity and added protection to this area.

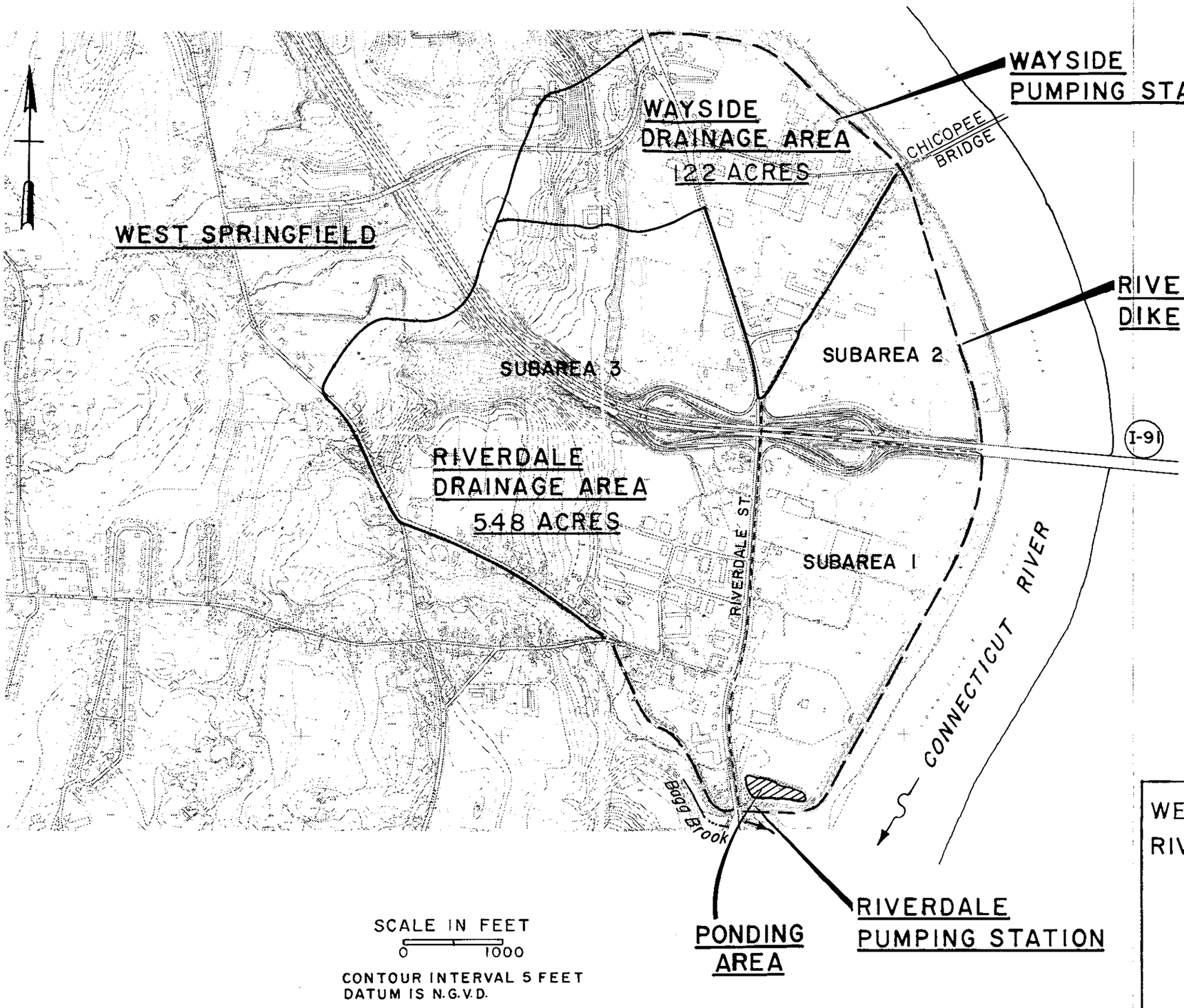
May we hear from you at your earliest convenience so as to be able to complete our advance planning for this area?

Very truly yours,
BOARD OF SELECTMEN

Phyllis A. Austin
PHYLLIS A. AUSTIN, Chairman

26 CENTRAL STREET
WEST SPRINGFIELD, MASS. 01089

Copy - Congressman Silvio Conte



RIVERDALE DRAINAGE AREA

SUBAREA #	D.A.
1	156 ACRES
2	100 "
3	292 "
TOTAL	548 ACRES

WEST SPRINGFIELD LPP REVIEW
RIVERDALE PUMPING STATION

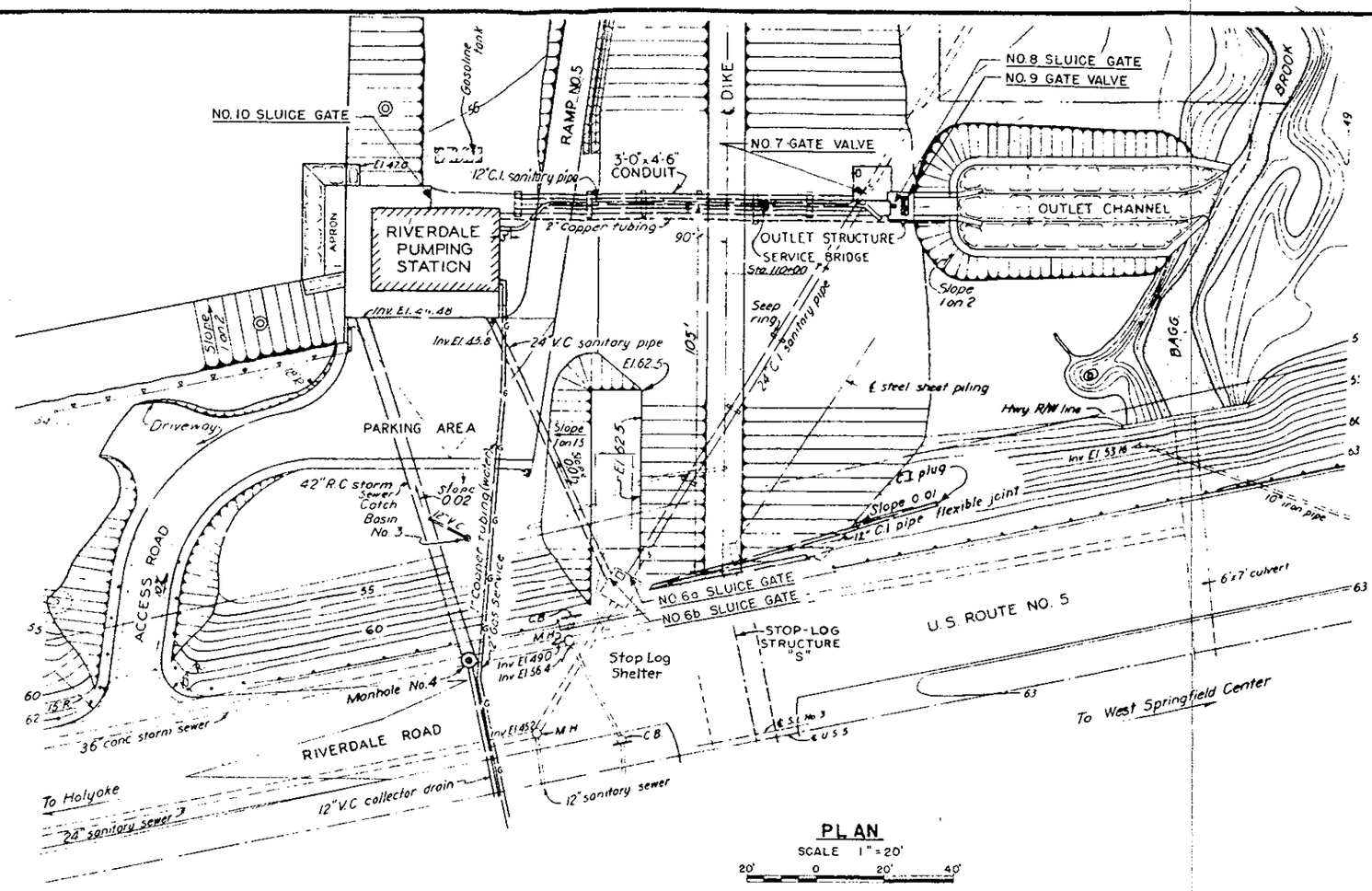
INTERIOR WATERSHED MAP

DEC. 1984

PLATE 1

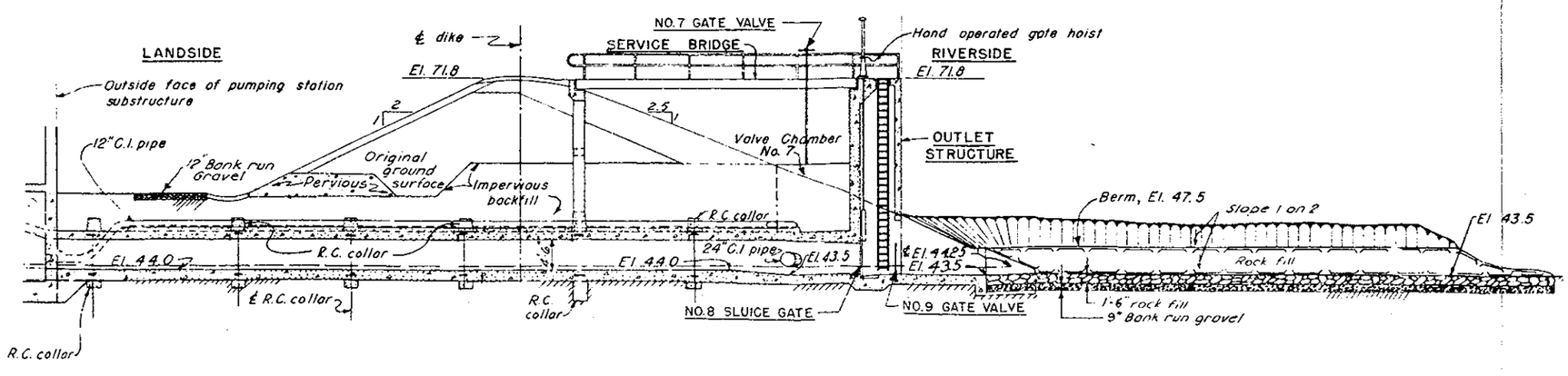
CORPS OF ENGINEERS

U. S. ARMY



PLAN

SCALE 1" = 20'



SECTION ON ℄ CONDUIT AND OUTLET CHANNEL

SCALE 1" = 10'

CONNECTICUT RIVER FLOOD CONTROL

RIVERDALE DIKE

WEST SPRINGFIELD, MASS.

GENERAL PLAN

RIVERDALE PUMPING STATION

CONNECTICUT RIVER MASSACHUSETTS

OPERATION AND MAINTENANCE MANUAL

PREPARED BY

CORPS OF ENGINEERS, U. S. ARMY.

OFFICE OF THE DIVISION ENGINEER

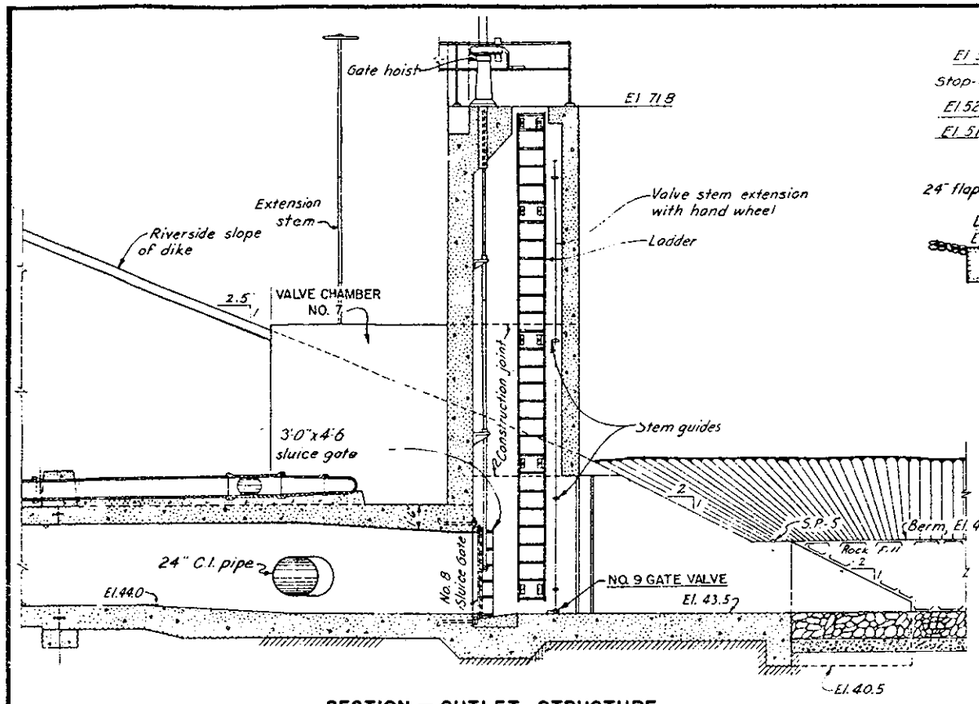
NEW ENGLAND DIVISION BOSTON, MASS.

DEC. 1950

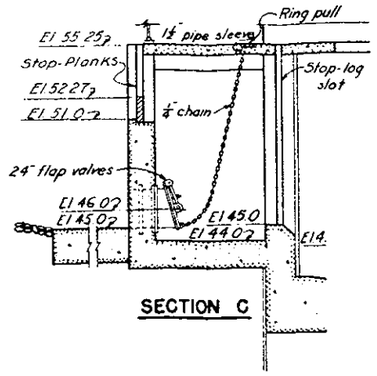
PLATE 2

CORPS OF ENGINEERS

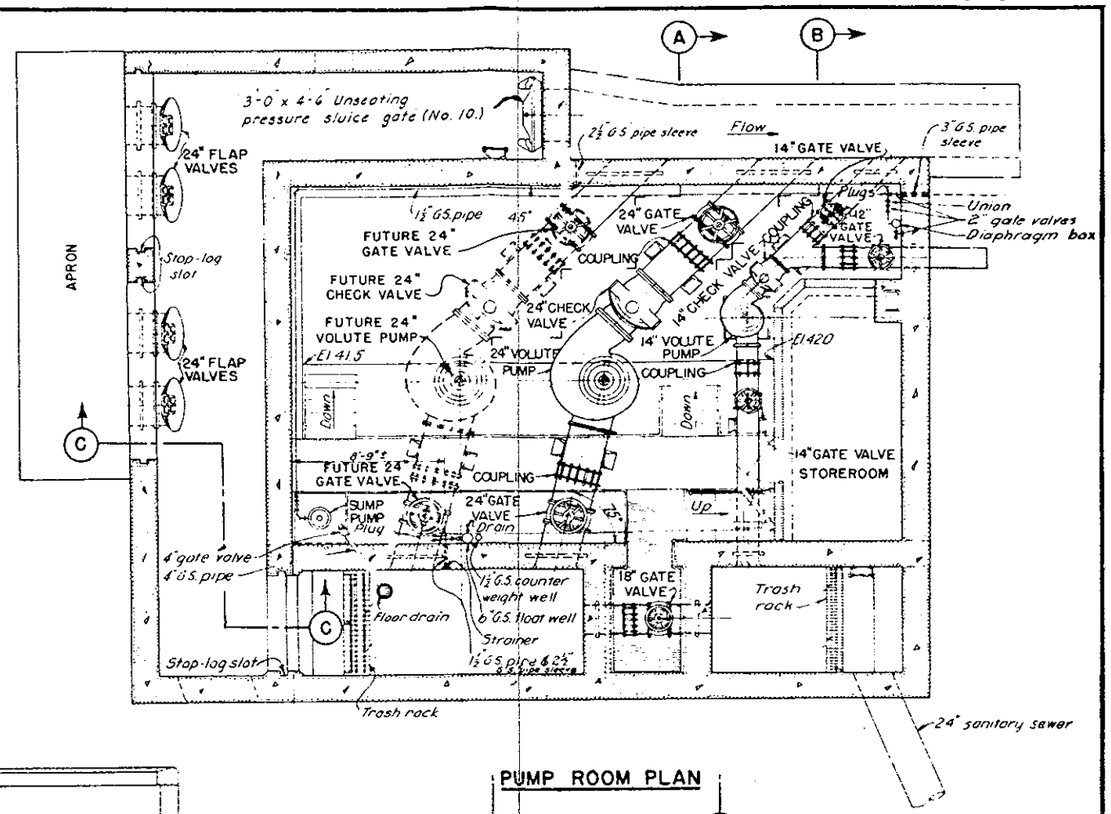
U. S. ARMY



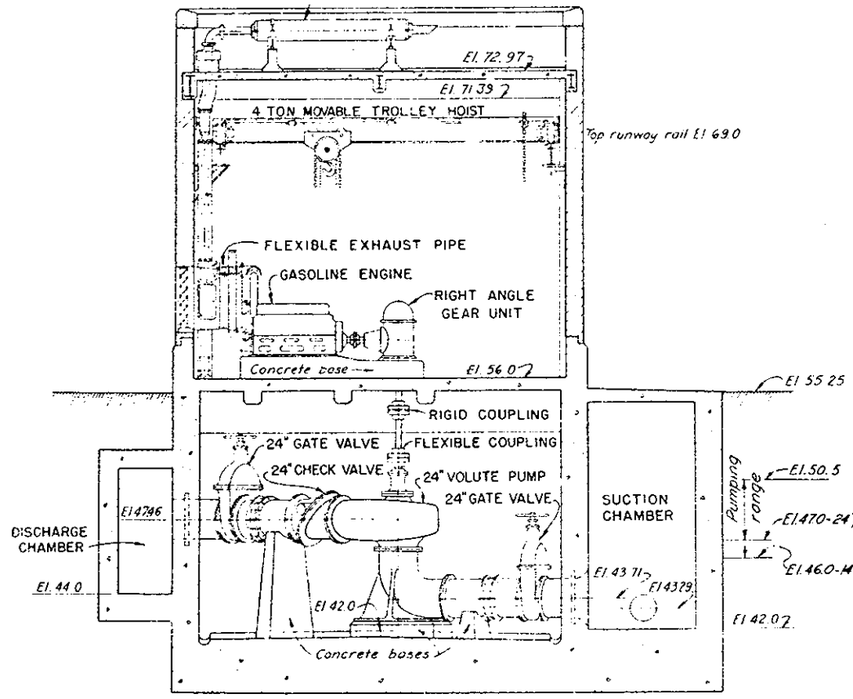
SECTION — OUTLET STRUCTURE



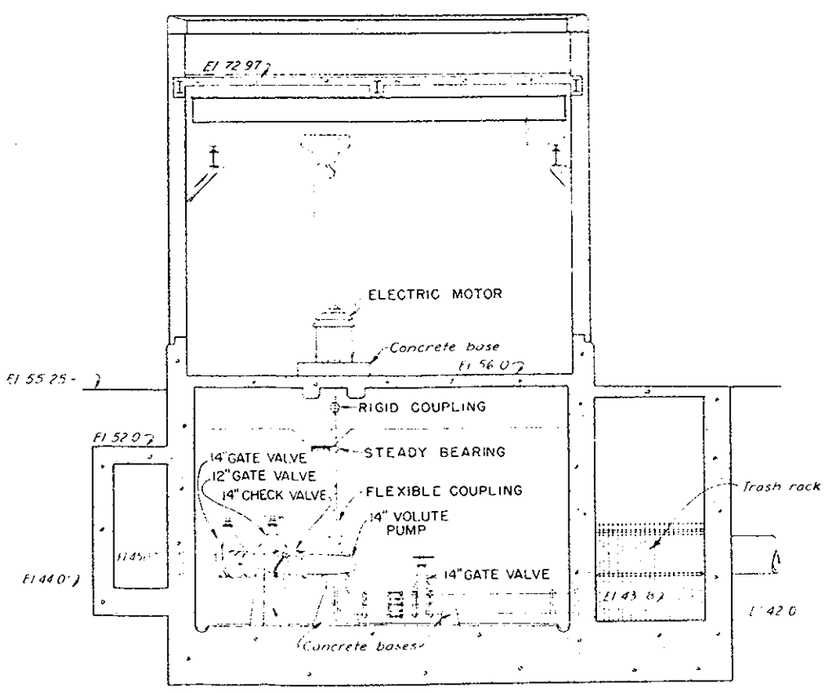
SECTION C



PUMP ROOM PLAN



SECTION A



SECTION B

NOTE:-

Stop planks to be left in place on weir at all times.

SCALE 1" = 1'-0"

CONNECTICUT RIVER FLOOD CONTROL

RIVERDALE PUMPING STATION

WEST SPRINGFIELD, MASS.

GENERAL ARRANGEMENT OF EQUIPMENT

CONNECTICUT RIVER MASSACHUSETTS

OPERATION AND MAINTENANCE MANUAL

PREPARED BY
CORPS OF ENGINEERS, U. S. ARMY.
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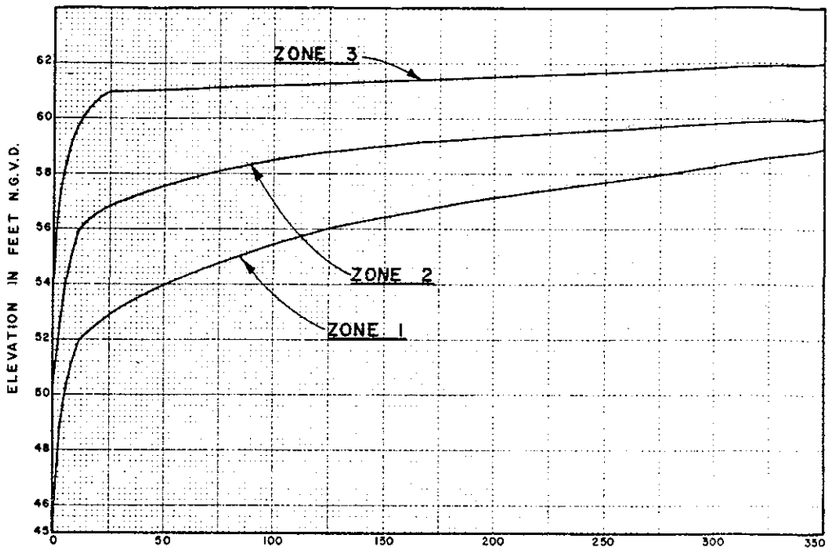
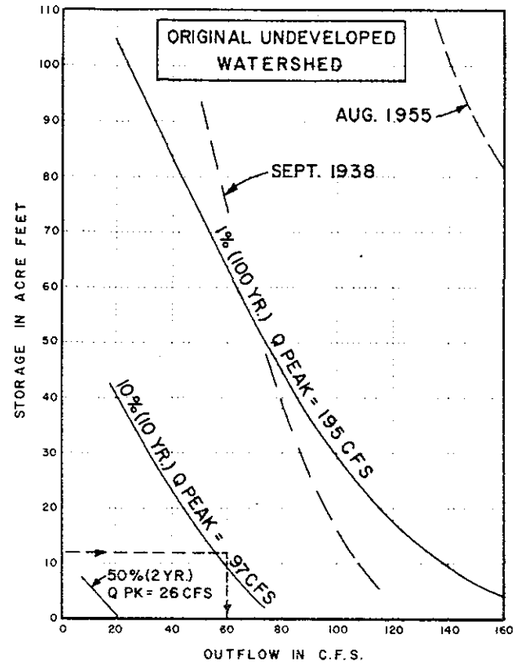
NEW ENGLAND DIVISION BOSTON, MASS.

DEC. 1950

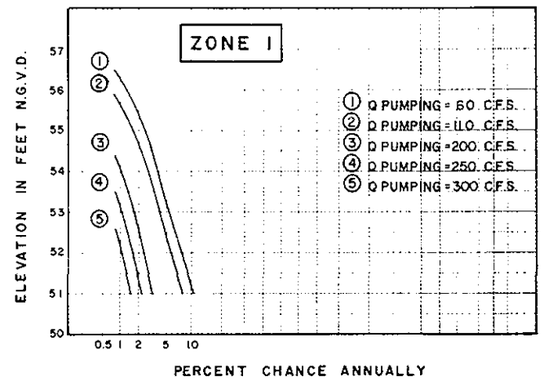
PLATE 3



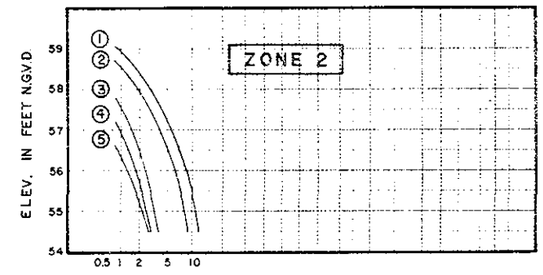
INTERIOR STORAGE CAPACITY

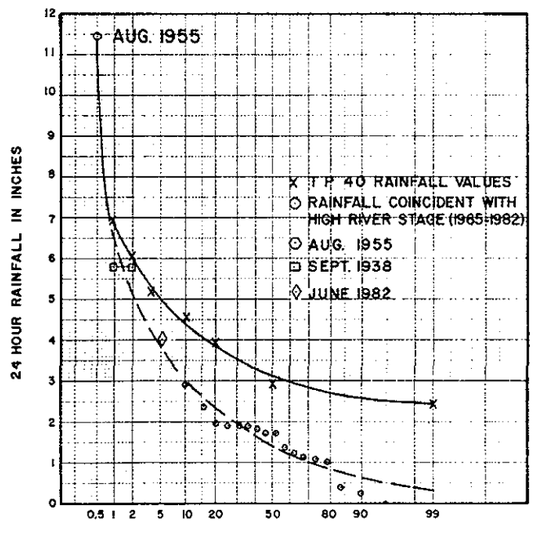


STORAGE VS OUTFLOW ANALYSIS

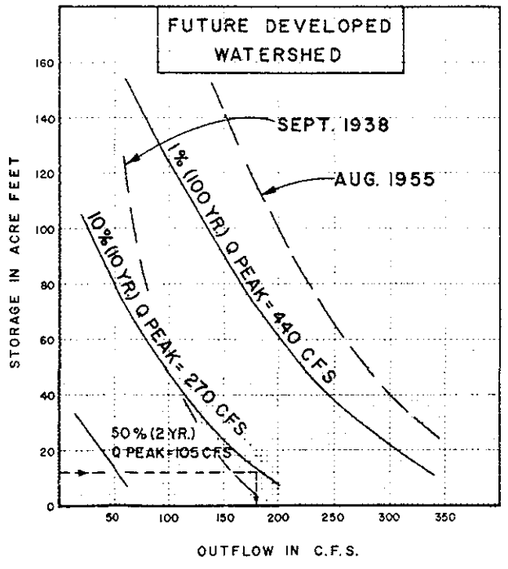


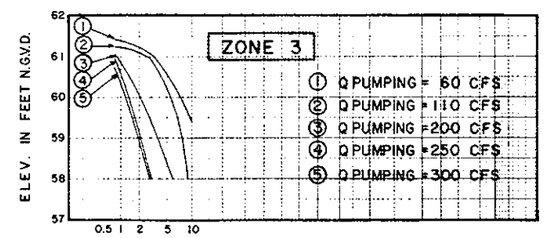
FUTURE CONDITION
STAGE FREQUENCY
VS
PUMPING CAPACITIES





ALL SEASON VS PUMPING
RAINFALL FREQUENCIES





DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

WEST SPRINGFIELD MASS. LPP REVIEW
RIVERDALE PUMPING STATION

INTERIOR DRAINAGE
ANALYSIS

HYDRO. ENGR. SECT. DEC. 1984

PLATE 4